

IN THE CLAIMS

1. (Previously Presented) An authentication communicating semiconductor device, comprising:

a main processing unit for generating a first key code according to a predetermined algorithm, for determining approval/non-approval of communication of data with an external device, and for controlling said communication of data;

an encryption unit for encrypting communication data to transmit to outside using said first key code generated by said main processing unit;

a first interface unit for performing first communication with an upper layer according to a first predetermined protocol; and

a second interface unit for performing second communication with a lower layer according to a second predetermined protocol,

wherein said main processing unit, said encryption unit, said first interface unit and said second interface unit are formed on a semiconductor chip,

wherein said encryption unit uses communication data received from an outside device using a second key code generated by said outside device,

wherein each of a standard of said first interface unit and a standard of said second interface unit is of a predetermined standard,

wherein said main processing unit, said encryption unit, and said first and second interface units are coupled to each other via an internal bus.

2. (Currently Amended) The authentication communicating semiconductor device according to claim 1, wherein said main processing unit comprises:

a nonvolatile memory having stored therein a program implementing a key generation algorithm and an authentication algorithm to authenticate said communication of data in connection with said external device by said external device requesting said communication of data;

a central processing unit for generating said first key code and for determining said approval/non-approval of said communication of data with said external device according to said program; and

a volatile memory for providing a work area for said processing unit,

said nonvolatile memory, said central processing unit, said volatile memory, said encryption unit, and said first and second interface units being coupled to each other via said internal bus,

wherein said predetermined standard is IEEE1394.

3. (Previously Presented) The authentication communicating semiconductor device according to claim 2, wherein:

said encryption unit includes a first register to which said first key code generated by said main processing unit is set; and

said encryption unit encrypts said communication data to transmit to said external device according to said first key code set via said internal bus to said first

register,

wherein said encryption unit decodes said communication data received from said external device according to said second key code set via said internal bus to said first register.

4. (Previously Presented) The authentication communicating semiconductor device according to claim 3, wherein:

each of said first and second interface units includes a second register to which a communication code is set; and

said first interface unit performs said first communication according to a first communication control code set by said main processing unit via said internal bus to said second register of said first interface unit,

said second interface unit performs said second communication according to a second communication control code set by said main processing unit via said internal bus to said second register of said second interface unit.

5. (Previously Presented) The authentication communicating semiconductor device according to claim 4, further comprising an external terminal coupled with said internal bus.

6. (Previously Presented) An electronic device, comprising:

an authentication communicating semiconductor device according to claim 5; and

an external memory coupled to said external terminal which is coupled to said internal bus, wherein:

a communication control program which includes a predetermined program for setting of a communication path is stored in said external memory; and

said main processing unit sets, according to said communication control program, said first communication control code to said second register of said first interface unit to perform said first communication with an external device and said second communication control code to said second register of said second interface unit to perform said

second communication with an external device.

7. (Currently Amended) An authentication communicating semiconductor device, comprising:

an encryption unit for encrypting, in an encrypting mode, ordinary data into encrypted data; for decoding, in a decoding mode, said encrypted data into said ordinary data; and for directly passing data therethrough when neither encryption nor decoding is required;

a lower-layer interface unit for said encrypted data of said encryption unit for controlling a first protocol of communication with a lower layer;

an upper-layer interface unit for said ordinary data of said encryption unit for controlling a second protocol of communication with an upper layer; and

a key generation unit for executing authentication processing of communication passing through said lower layer and for executing key generation processing for said encryption unit, wherein:

said lower-layer interface unit comprises a lower-layer communication path for communicating said encrypted data

with a lower-layer device controlling a communication signal outside said semiconductor chip;

    said upper-layer interface unit comprises an upper-layer communication path for communicating said ordinary data with an upper-layer device outside said semiconductor chip;

    said key generation unit comprises a CPU, a ROM, and a RAM;

said CPU sets an encryption key for said encryption unit to a key register, a first control value to a first control register of said lower-layer interface unit via a bus coupled to said CPU, and a second control value to a second control register of said upper-layer interface unit via said bus; and

    said encryption unit, said lower-layer interface unit, and said upper layer interface unit are coupled to each other via said bus,

wherein said encryption unit, said lower-layer interface unit, said upper-layer interface unit, and said key generation unit are formed on a single chip, and

wherein a standard of said lower-layer interface unit and a standard of said upper layer interface unit is a

predetermined standard.

8. (Currently Amended) The authentication communicating semiconductor device according to claim 7, further comprising:

    a first communication path and a second communication path between said lower-layer interface unit and said upper-layer interface unit without passing said encryption unit,

    said upper-layer interface unit comprising a first upper-layer communication path and a second upper-layer communication path for communicating signals with said upper-layer device outside said semiconductor chip,

    said first upper-layer communication path being capable of selecting data from said encryption unit and data from said lower-layer interface unit without passing through said encryption unit, and

    said second upper-layer communication path being capable of selecting data from said first communication path and data from said second communication path,

wherein said predetermined standard is IEEE1394.

9. (Previously Presented) The authentication communicating semiconductor device according to claim 7, wherein:

    said encryption unit comprises a first encryption circuit and a second encryption circuit;

    said upper-layer interface unit includes a first upper-layer interface unit and a second upper-layer interface unit;

    a communication path of said ordinary data of said first encryption circuit is coupled to said first upper-layer interface circuit;

    a communication path of said ordinary data of said second encryption circuit is coupled to said second upper-layer interface circuit;

    said first upper-layer interface unit includes a first upper-layer communication path for communicating signals with a first upper-layer device outside said semiconductor chip; and

    said second upper-layer interface unit includes a second upper-layer communication path for communicating signals with a second upper-layer device outside said

semiconductor chip.

10. (Previously Presented) The authentication communicating semiconductor device according to claim 8, further comprising an electrically rewritable nonvolatile memory formed on said single semiconductor chip,

wherein said electrically rewritable nonvolatile memory is coupled to said internal bus.

11. (Previously Presented) The authentication communicating semiconductor device according to claim 7, wherein said lower-layer device is formed on said semiconductor chip, wherein said authentication communicating semiconductor device comprises a communication path for communicating signals with said lower-layer device.

12. (Canceled) .

13. (Currently Amended) An authentication communicating semiconductor device, comprising:

a semiconductor chip:

a main processing unit for generating a first key code according to a predetermined algorithm, for determining approval/non-approval of communication of data with an external device, and for controlling said communication of data;

an encryption unit for encrypting communication data to transmit to an external device using said first key code generated by said main processing unit; and

an interface unit for performing said communication of data with an upper-layer or a lower-layer according to a predetermined protocol,

wherein said main processing unit, said encryption unit and said interface unit are formed on said semiconductor chip,

wherein said encryption unit decodes communication data received from said external device using said second key code generated by said outside device,

wherein a standard of said interface unit is a predetermined standard, and

wherein said main processing unit, said encryption unit, and said interface units are coupled to each other via an internal bus.

14. (New) The authentication communicating semiconductor device according to claim 13, wherein said predetermined standard is IEEE1394.